

REMARKS

Applicants appreciate the detailed examination evidenced by the Office Action mailed February 28, 2006 (hereinafter "Office Action"). Applicants have amended independent Claims 1, 12, 23 and 27 to further clarify patentable distinctions between these claims and the various ones of U.S. Patent No. 6,894,386 to Poo et al. (hereinafter "Poo"), U.S. Patent No. 6,746,898 to Lin et al. (hereinafter "Lin") and U.S. Patent No. 5,874,770 to Saia et al. (hereinafter "Saia") cited in rejecting these claims. Several of the dependent claims have been amended consistent with the amendments to the independent claims. Applicants have also added new Claims 60-62, which claim subject matter supported by the disclosure of the application as filed and which are patentable over the cited references. Reasons supporting patentability of the claims as amended are presented below.

Independent Claims 1, 12, 23 and 27 are patentable over Poo, Lin and Saia

Independent Claims 1, 12, 23 and 27 stand rejected as anticipated by Poo. Office Action, p. 2. Applicants have amended Claim 1 to recite:

. . . a monolithic microelectronic substrate including a plurality of integrated circuit dice and a redistribution structure thereon providing an edge connector contact coupled to at least one of the plurality of integrated circuit dice, ***the edge connector contact configured for mating with a contact of an edge connector that is configured to engage an edge of the substrate.***

Such recitations are supported by the application as filed, e.g., by FIGs. 4-8 and the accompanying textual description thereof.

At column 5, lines 41-60, Poo describes, with reference to FIGs. 3B, "edge contacts" 309₁ and 309₂ formed on edges of die 301, 302 by cutting through a "contact" 309 formed along a saw street 305. However, the edge contacts 309₁ and 309₂ are not "edge connector contacts" as recited in Claim 1, i.e., the edge contacts 309₁ and 309₂ are not "configured for mating with a contact of an edge connector that is configured to engage an edge of the substrate." Rather, these edge contacts 309₁ and 309₂ are configured for providing contacts for individual die once they are separated. See Poo, column 7. Accordingly, Poo does not disclose or suggest all of the recitations of amended independent Claim 1 and, for at least these reasons, Applicants submit that amended independent Claim 1 is patentable over Poo.

Independent Claim 12, which also stands rejected as anticipated by Poo, has been amended to recite:

. . . a microelectronic substrate including a plurality of integrated circuit dice therein ; and

a redistribution structure comprising interleaved conductive and insulation layers formed on the plurality of integrated circuit dice, the redistribution structure extending across a surface of the substrate to overlie at least portions of each of the plurality of integrated circuit dice and including at least one conductive layer including ***a compressive connector contact opposite the surface of the substrate and coupled to at least one of the plurality of integrated circuit dice.***

Such recitations are supported by the application as filed, for example, by FIGs. 4-8 and the description thereof.

The recitations of Claim 12 are neither disclosed nor suggested by Poo. In particular, while the above-cited passage from column 5 of Poo describes a wafer stage product including edge contacts 309₁ and 309₂ formed by partially sawing through the wafer 300 (see Poo, column 5, lines 46-48), the edge contacts 309₁ and 309₂ face parallel to the surface of the substrate 300 and, thus, are not oriented as recited in amended independent Claim 12. Accordingly, Poo does not disclose or suggest all of the recitations of amended independent Claim 12 and, for at least these reasons, Applicants submit that amended independent Claim 12 is patentable over Poo.

Independent Claim 23 has been amended to recite:

. . . a wafer having a plurality of integrated circuit dice therein and a redistribution structure extending across a surface of the wafer to overlie at least portions of each of the plurality of integrated circuit dice, ***the redistribution structure including a connector contact facing opposite the surface of the wafer and coupled to at least one of the plurality of integrated circuit dice.***

Such recitations are supported by the application as filed, for example, by the description at pages 7-9 with reference to FIGs. 4-7 and 12.

As noted above, Poo describes edge contacts 309₁ and 309₂ that face parallel to the surface of the substrate 300. Accordingly, Poo does not disclose or suggest the orientation of a connector contact recited in amended independent Claim 23 and, for at least these reasons, Applicants submit that amended independent Claim 23 is patentable over Poo.

Independent Claim 27 has been amended to recite:

. . . a monolithic microelectronic substrate including a plurality of unseparated integrated circuit dice and a multilayer redistribution structure comprising interleaved conductive and insulation layers, the redistribution structure extending across a side of the substrate to overlie at least portions of each of the plurality of unseparated integrated circuit dice, *the redistribution structure including at least one conductive layer including an edge connector contact facing opposite the side of the substrate and electrically coupled to at least one of the plurality of integrated circuit dice.*

Such recitations are supported by the application as filed, for example, by FIGs. 4-8 and the textual description thereof. Poo does not disclose or suggest such an edge connector contact orientation and, for at least these reasons, Applicants submit that amended independent Claim 27 is patentable over Poo.

Independent Claims 1 and 23 also stand rejected as allegedly anticipated by Lin and Saia. Office Action, p. 3. Regarding Claim 1, Saia does not appear to disclose or suggest an "edge connector contact" as recited in Claim 1. The Office Action cites passages from columns 7 and 8 and FIG. 12 of Saia as allegedly teaching that the patterned interconnect metallization 56 shown in FIG. 12 of Saia is a connector contact (see Office Action, pp. 3 and 4). However, these passages do not appear to indicate that the "patterned interconnect metallization 56" is a *connector* contact, much less an *edge connector* contact configured as recited in amended Claim 1. Accordingly, Applicants submit that Saia does not disclose or suggest all of the recitations of amended Claim 1 and, for at least these reasons, Applicants submit that amended Claim 1 is patentable over Saia.

Lin also does not disclose or suggest all of the recitations of amended Claim 1. Contrary to the assertions of the Office Action on page 4, the integrated circuit package structure shown in Lin is not identical to the flexible interconnect structure described in Saia. Moreover, while Lin describes a package structure including a bonding point 160 that "might include a bump, pin, or the like" (Lin, column 5, lines 27-34), Lin does not disclose or suggest, among other things, an "edge connector contact configured for mating with a contact of an edge connector that is configured to engage an edge of the substrate" as recited in amended Claim 1. Accordingly, Lin does not disclose or suggest all of the recitations of amended Claim 1 and, for at least these reasons, Applicants submit that amended Claim 1 is patentable over Lin.

With respect to amended Claim 23, Applicants submit that neither Saia nor Lin disclose or suggest a *wafer* as recited in amended Claim 23. Saia describes a *flexible interconnect film* to which a circuit chip is attached (see Saia, column 7, lines 1-8), which does not disclose or suggest "a wafer having a plurality of integrated circuit dice *therein*," as recited in amended Claim 23. Similarly, Lin describes a package structure in which chips are adhered to a substrate with conductive paste or adhesive tape (see Lin, column 3, lines 50-54), which also does not disclose or suggest "a wafer having a plurality of integrated circuit dice therein," as recited in amended Claim 23. In addition, along lines discussed above, Saia does not appear to disclose or suggest a "connector contact" as recited in Claim 23. Accordingly, Applicants submit that neither Saia nor Lin discloses or suggests all of the recitations of amended independent Claim 23 and, for at least these reasons, Applicants submit that amended independent Claim 23 is patentable over Saia and Lin.

Regarding amended independent Claim 12, which also stands rejected as obvious over Saia (see Office Action, p. 4), Applicants note that, along lines discussed above, Saia does not disclose or suggest a "connector contact" as recited in Claim 12. The grounds for modifying Saia provided on page 4 of the Office Action are also erroneous, as an underlying premise of these grounds, *i.e.*, that Saia discloses that the patterned interconnect metallization 56 is connector contact, is erroneous for at least the reasons discussed above. Accordingly, Applicants submit that there is no disclosure or suggestion to modify Saia as proposed in the Office Action and, for at least these reasons, Applicants submit that Claim 12 is patentable over Saia.

Regarding the rejection of Claim 27 based on Saia (see Office Action, p. 4), Applicants submit that Saia does not disclose or suggest an edge connector contact as recited in amended independent Claim 27 or the specific orientation of the edge connector contact recited in amended independent Claim 27. Accordingly, Applicants submit that Saia does not disclose or suggest the recitations of amended independent Claim 27.

The Office Action further concedes that Saia does not disclose unseparated integrated circuit dice, but states that "an electronic module, which comprises unseparated integrated circuit dice, as applicant claimed, does not produce any new or unexpected result" and that, therefore "it would have been obvious . . . to consider the dice (44) in Saia et al.'s electronic module to construct with a plurality of unseparated integrated circuit dice since such dice

may comprise any number of electrical circuit components." Office Action, p. 4. Applicants respectfully submit that this reasoning is incorrect.

A *prima facie* showing of obviousness requires clear and particular evidence from the prior art of a motivation to modify a reference to produce the specific recitations of a claim. See, e.g., *In re Dembiczak*, 50 U.S.P.Q.2d 1614, 1617 (Fed. Cir. 1999); *In re Kotzab*, 55 U.S.P.Q.2d 1313, 1317 (Fed. Cir. 2000). The above-quoted argument from the Office Action provides no such evidence, as the Office Action fails to provide any citation or other specific evidence from the prior art of a teaching or suggestion to modify the structures shown in Saia to include a plurality of unseparated integrated circuit dice. Applicants are not required to show a "new or unexpected result" absent such a *prima facie* showing. Rather, the Office Action must provide evidence of "some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings" and evidence of "a reasonable expectation of success." MPEP 2143. "The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure." Id. For at least these reasons, Applicants submit that amended Claim 27 is patentable over Saia.

The dependent claims are patentable

Applicants submit that dependent Claims 2-11, 13-22, 24-26 and 28-39 are patentable at least by virtue of the patentability of the various ones of independent Claims 1, 12, 23 and 27 from which they depend. Applicants further submit that several of the dependent claims are separately patentable.

For example, amended Claim 13, recites "wherein the connector contact comprises an edge connector contact configured for mating with a contact of an edge connector that is configured to engage an edge of the substrate." As discussed above with reference to Claim 1, none of the cited references disclose or suggest such a contact configuration and, for at least these reasons, Applicants submit that Claim 13 is separately patentable.

Amended Claim 14 recites "wherein the plurality of integrated circuit dice comprises a plurality of unseparated integrated circuit dice." As discussed above with reference to

Claim 27, Saia (and the cited references) does not disclose or suggest such recitations. For at least these reasons, Applicants submit that Claim 14 is separately patentable.

Claim 30 recites "wherein the edge connector contact is disposed adjacent an edge of the substrate, and wherein the protection layer is disposed on a surface of the substrate opposite the redistribution structure and underlies the edge connector contact." As discussed above, none of the cited referenced disclose or suggest an edge connector contact as recited in Claim 27. Accordingly, the cited references also do not disclose or suggest the positioning of the edge connector contact recited in Claim 30, or the recited relationship between the protection layer and the edge connector contact. For at least these reasons, Applicants submit that Claim 30 is separately patentable.

New Claims 60-62 are patentable

Applicants have added new Claims 60-62, which are supported, for example, by FIGs. 4 and 5 and the description thereof. Applicants submit that these claims are patentable over the cited references. For example, along lines discussed above, none of the cited references discloses or suggests a "redistribution structure comprising a row of connector contacts disposed adjacent and extending along an edge of the substrate and electrically coupled to the plurality of integrated circuit dice," as recited in Claim 60 or "wherein the respective contacts of the row of connector contacts is configured to mate with respective contacts of an edge connector that is configured to engage an edge of the substrate," as recited in Claim 61.

Conclusion

As all of the claims are now in condition for allowance, Applicants respectfully request allowance of the claims and passing of the application to issue in due course. Applicants urge the Examiner to contact Applicants' undersigned representative at (919) 854-1400 to resolve any remaining formal issues.

Respectfully submitted,



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